Frontiers of Extreme Computing 2007 Zettaflops Workshop

Erik P. DeBenedictis

Sandia National Laboratories

- **Schedule Notice**
  - **We will start a few minutes late due to important people still eating breakfast**
  - **Nathan Price is due to arrive at 2 PM. If he is delayed, we will need to switch his talk with somebody on Wednesday**

History

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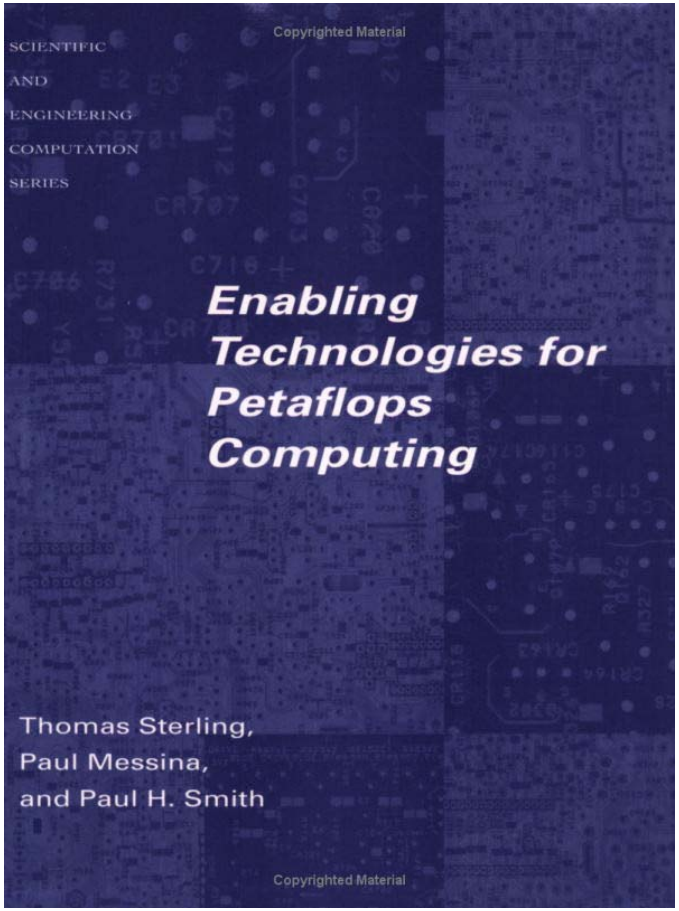
History and Book

- 1994 Petaflops I, Pasadena
- 1999 Petaflops II, Santa Barbara
- 2002 WIMPS, Bodega Bay
- 2005 Zettaflops, Santa Cruz
- 2007 Zettaflops, Santa Cruz

- [Note: there were other activities]



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Petaflops/Zettaflops Format

- These are interdisciplinary workshops on computation in the future
  - Technology is best sold for the benefit of its use to society
    - This is an objective of the workshop
  - We assemble people representing the self-organized “technology stack” that benefits society through computation, reinforcing our team

What Can We Accomplish?
(Erik's Suggestion, need your help)

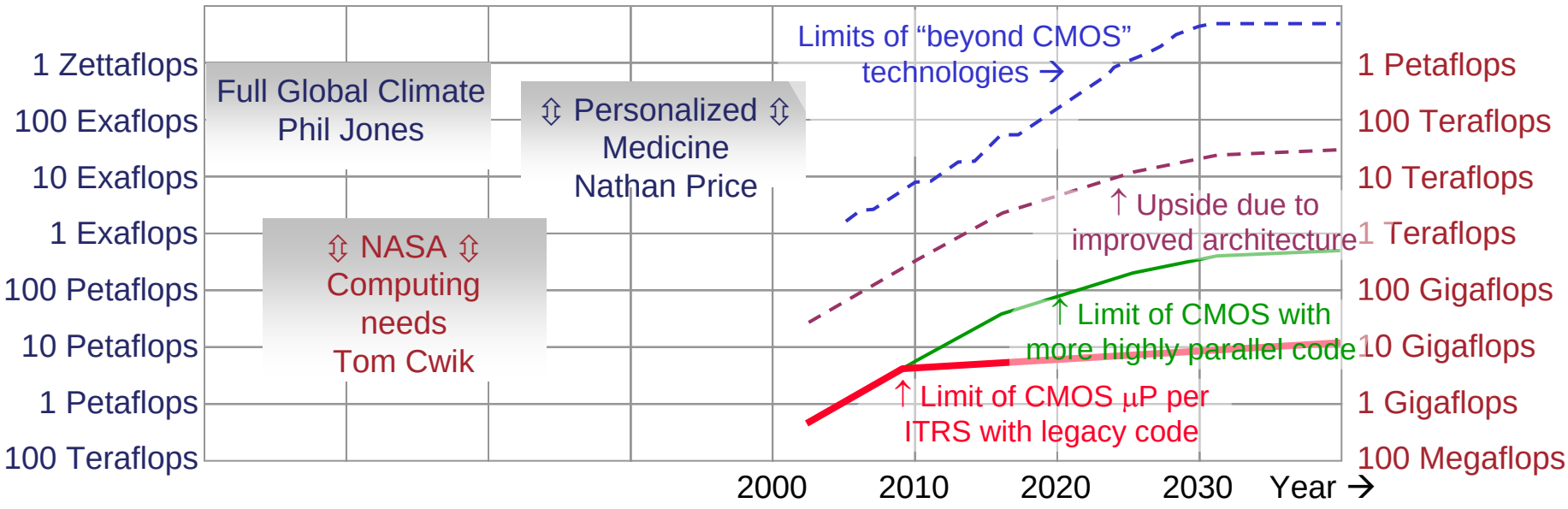
What Can We Accomplish? (Erik's Suggestion, need your help)

- We have a unique group
  - Broader: Devices through applications
- There are several post-petaflops activities approaching Congress
- Zettaflops is not a part of any such initiative, but we are funded by DOE, DARPA, and have participation by several other Government agencies, and industry

- Action: Leverage our unique breadth by thinking through the key, broad cross-cutting issue of the day
- See if we can support one or more of the advanced computing initiatives, increasing the likelihood of their getting funded
- The cross-cutting issue: how much value to society will result from different computational technology investments

Objective of Workshop: Fill In Blanks Here

Supercomputer Performance (5 MW) | Applications | Technology | Mobile Performance (5 W)



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Delivering Result

- One result: Thomas Sterling as agreed to write a monograph
- Another result: Talks on Website and personal relationships enabling rhetoric in the future
- Action to Result
  - By Thursday lunch, have collected raw material for above
- Working groups: Participants please come to consensus on what you can agree upon

Technical Organization

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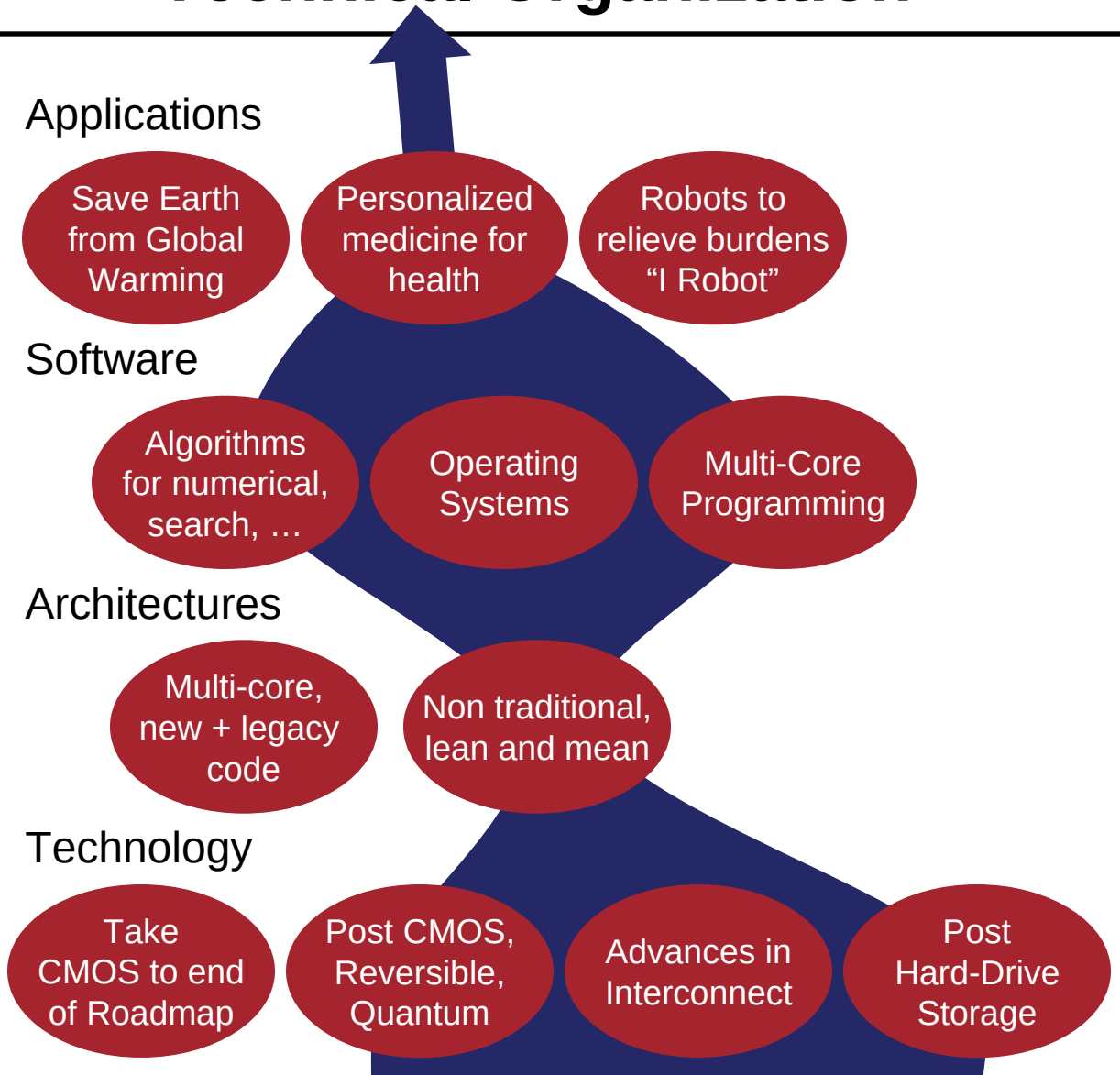
Technical Organization



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Tuesday Speakers

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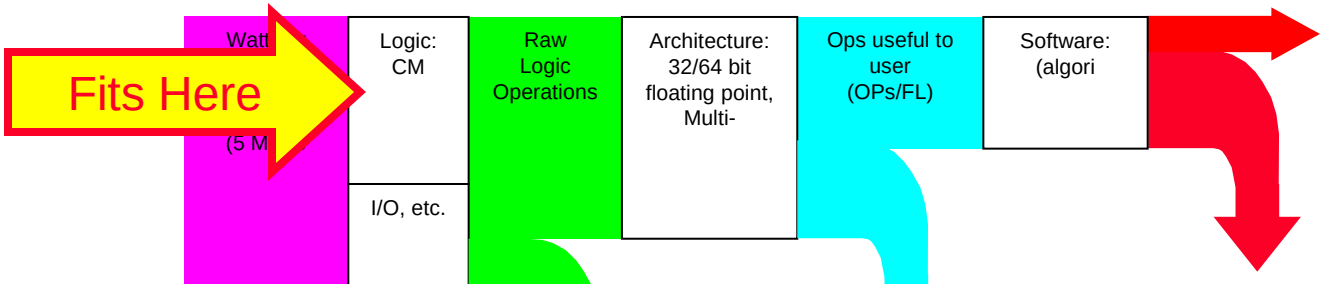
Stan Williams

- **Talk Title: *Sprinting Toward the Practical Limits of Computation***
- **Speaker Title: HP Senior Fellow**
- **History: Presented at 2005 Workshop**
- **Upside Potential: Easy upside of 100x, another upside of 100x, hard going for the next 100x**



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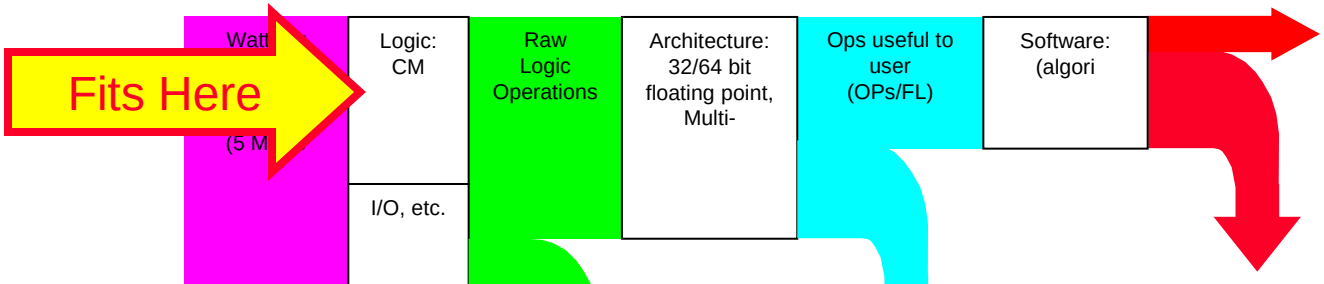
Jag Shah

- **Talk Title: *UNÍC: Intrachip Photonic Communications,***
- **Speaker Title: Program Manager**
- **History: New to Workshop**
- **Upside Potential: Raising performance at the lower levels due to improved efficiency in optical communications**



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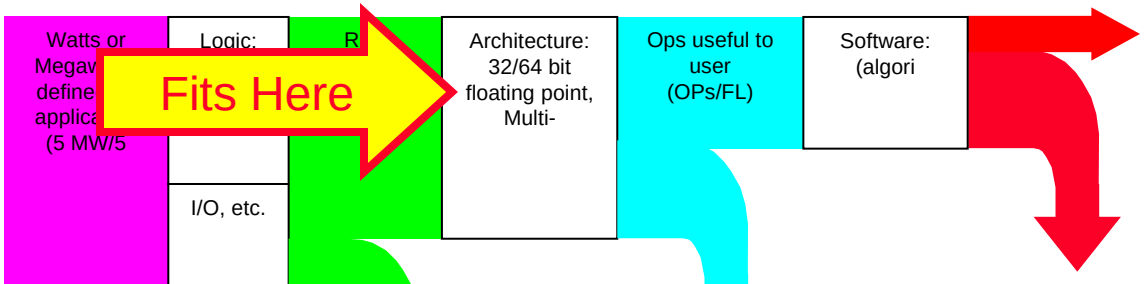
Steve Scott

- **Talk Title: *Supercomputer Architecture***
- **Speaker Title: CTO, Cray**
- **History: Participated in 2005 Workshop**
- **Upside Potential: Architecture is a middle layer of the technology stack. An efficiency gain or loss at the architecture level “cross cuts” to all other levels.**



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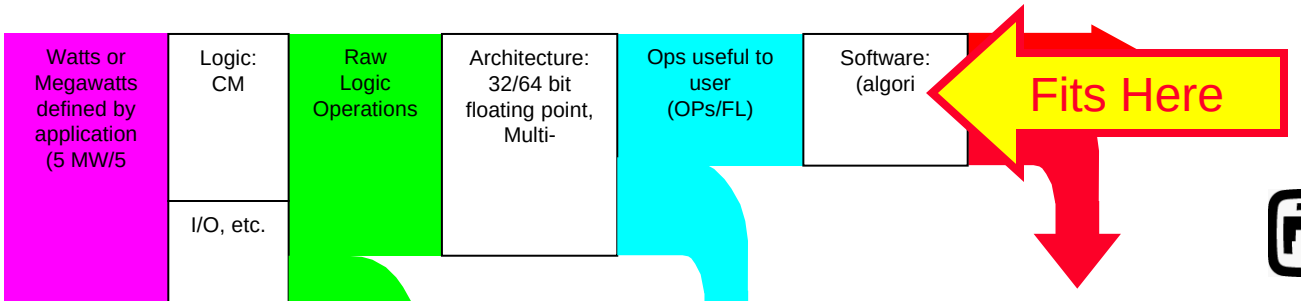
Kathy Yelick

- **Talk Title: *Programming Techniques to Harness Exaflops***
- **Speaker Title: Professor**
- **History: New to Workshop**
- **Upside Potential: With flat lining clock rates, performance gains are dependent on programming techniques the permit effective use of more-and-more processors**



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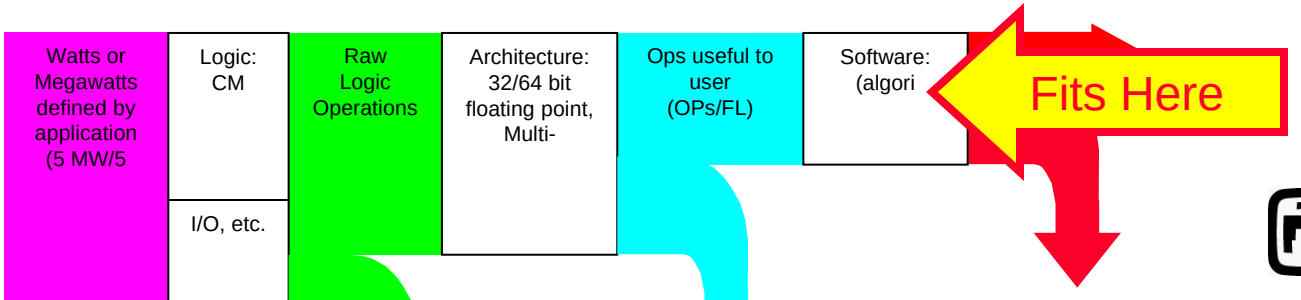
David Keyes

- **Talk Title: *Scaling to Exaflop/s for Mesh-based Algorithms***
- **Speaker Title: Faculty, Columbia**
- **History: Presented in 2005 Workshop**
- **Upside Potential: With flat lining clock rates, performance gains are dependent on programming techniques the permit effective use of more-and-more processors**



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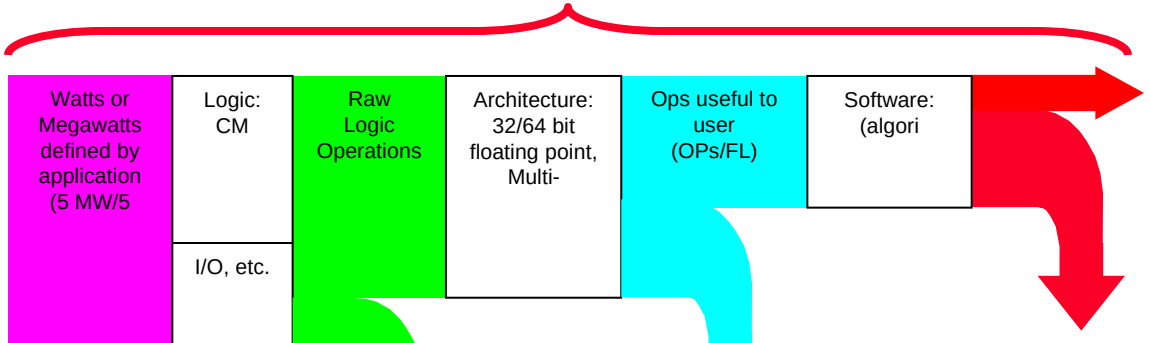
Sudip Dosanjh

- **Talk Title: *Sandia's Programs in Supercomputing and Nanotechnology***
- **Speaker Title: Senior Manager, Sandia National Laboratories**
- **History: Participated in 2004 Workshop**
- **Upside Potential: National Laboratories perform original R&D and can act as user facilities**

Talk covers Sandia's Activities across whole spectrum



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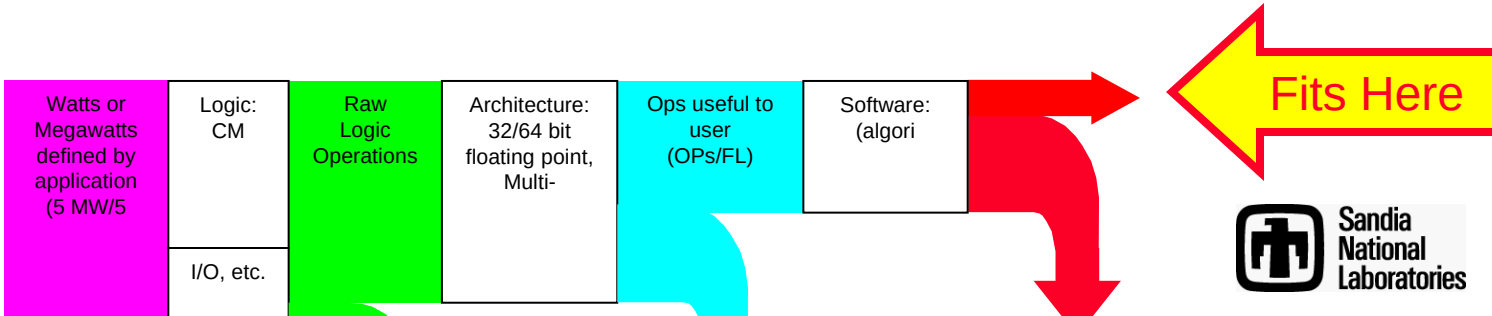
Nathan Price

- **Talk Title:** ***Computing Challenges for Systems Biology and Personalized Medicine***
- **Speaker Title: Faculty, UIUC**
- **History: New to Workshop**
- **Upside Potential: This is an application of value to society, this and some other applications drive the entire industry**



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